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BREEDING OF AQUATIC BIRDS IN MID-WESTERN AUSTRALIA

By P. J. FULLER, Como.

Carnaby (1954) and Robinson (1955) have demonstrated the existence of a double breeding season for land birds in the north-west, with peaks in the autumn and spring. Their nesting data have been analysed by Serventy and Marshall (1957) who conclude that this bimodality of nesting frequency is due to summer and winter rains which stimulate breeding, though drought conditions may eliminate one or both peaks. Rainfall during the summer period usually results from the activity of tropical cyclones which frequently cross the coast between Port Hedland and Carnarvon and travel in a south-easterly direction towards the Great Australian Bight (Gentilli, 1956); winter rain generally results from southern rain-bearing low pressure systems controlling the weather in this region.

The breeding seasons of aquatic-birds in the north-west were only partly dealt with by Carnaby and Robinson. During the last few years I have participated in several field trips in this region and collected data on the factors stimulating the breeding of aquatic bird species and affecting their relative abundance. These data form the basis of this contribution.

OBSERVATIONS IN 1960

In February 1960, due to low pressure systems being active in the tropics, abnormally widespread torrential rain was received over most of the north-west and central western regions of the State. In the Murchison and Gascoyne districts pastoral stations recorded up to 21 inches, most recording in excess of five inches. Widespread flooding in many localities, and overflowing of the larger river systems including the Murchison, Gascoyne and Ashburton Rivers, resulted in most of the lake systems in the region being filled with large expanses of water up to several feet deep.

The filling of these lakes had a profound effect since not only were several aquatic bird species recorded in this region for the first time, but they were present in great abundance. Observations on these species are set out below.

Gull-billed Tern, *Gelochelidon nilotica*

This species was recorded in large numbers on all the lakes between Austin, Nannine and Polele Station from April 15 to 17, a census of actual numbers seen being as follows: four feeding over dry samphire flats about a half mile from Lake Austin; about 80 in flight over wide area over Nallan clay pan and dam; 38 feeding over dry samphire flats three miles south of Nannine; over 150 on the western end of Lake Nannine, at Nannine; and over 230 flying over and resting on numerous islets on the eastern end of Lake Nannine and Polele Station. It was estimated that many hundreds, if not thousands, of these terns were in the area. The terns were in nuptial plumage which indicated that they would probably nest in the locality, but this was not confirmed as I was unable to make further visits.

However, I was later informed by G. A. Lodge that he had located a small nesting colony on a lake on Wagga Wagga Station, 30 miles east of Yalgoo. I visited this lake on September 20, when over 200 terns were counted and on one of the islets in the lake 49 nests with eggs and 13 nests in various stages of construction were found. The lake was approximately two miles in length and about one and a half miles in width and varied in depth from one foot to three feet, its entire perimeter being vegetated with samphire whilst there were numerous elongated islets in the lake.

The nests 3-5 ft. apart were depressions in the sand, some half to one inch deep, having an internal diameter of about $4\frac{1}{2}$ in. and lined with pieces of dead samphire and grasses.

Marsh Tern, *Chlidonias hybrida*

As with the previous species, the Marsh Tern occurred in abundance throughout the whole lake system between Austin, Nannine and Polele Station, during the period from April 15 to 17, about 250 birds being noted near Nannine and about 300 on Polele Station. All birds observed were in nuptial plumage. Like the preceding species it was estimated that there were at least several hundred Marsh Terns in the district.

A small nesting colony of about 30 pairs was found on clumps of samphire growing in about 2 ft. 6 in. of water in Lake Nannine. The nests were bulky structures and attached to the samphire bushes, constructed of pieces of samphire in the form of a mound about 12-15 in. in diameter at the base, about 6-7 in. in diameter at the top and rising to about 12 in. above the water.

Silver Gull, *Larus novae-hollandiae*

On September 20, six or seven gulls associated with Gull-billed Terns were seen on the lake on Wagga Wagga Station, 30 miles east of Yalgoo.

Two nests, with one egg and three eggs, were found on the islet on which the Gull-billed Terns were nesting. It is noteworthy that this lake is situated approximately 150 miles from the coast, the normal habitat of the Silver Gull.

Banded Stilt, *Cladorhynchus leucocephalus*

I. C. Carnaby, on visiting the Wagga Wagga Lake on November 8, found 40-50 depressions in preparation for nesting but when we returned on November 26, nesting had been abandoned, probably because the lake was drying out. About 400 stilts were present on both visits.

OBSERVATIONS IN 1961

As in 1960, thunderstorms due to tropical cyclonic disturbances brought good rains to the Gascoynes and upper Murchison districts and up to six inches being recorded during February. This caused local flooding in the Gascoyne and Murchison Rivers. It was decided, therefore, to visit the Gascoyne area in order to collect breeding data, especially on water frequenting birds. Consequently I. C. Carnaby and I were in the region from March 31 to April 4, details of observations made being set out below.

Black Cormorant, *Phalacrocorax carbo*

On April 3 a nest with one fresh egg was found in a river gum standing in the water of a large pool along the Gascoyne River, on Mt. Clere Station. The white patch on the flank of the cormorant was noted as it flew off the nest.

Pacific Heron, *Ardea pacifica*

Six nests about 15-30 ft. from the ground in river gums besides pools on the Murchison River were found on Yarlarweelor Station on April 2. All nests contained large nestlings.

At a pool on the Gascoyne River on Mt. Clere Station, seven nests were found in river gums on April 3. Five nests contained nestlings, one contained three eggs and one young, and the remaining nest, three eggs.

Yellow-billed Spoonbill, *Platalea flavipes*

About six nests in river gums at a large pool on the Gascoyne River on Mt. Clere Station were found on April 3. The nests were not examined but eight adults were observed in the vicinity of the pool.

DISCUSSION

Breeding of ground-nesting aquatic-birds in mid-western Australia is triggered by rainfall sufficient to fill the lakes to a depth such that islets are formed. It is on these islets that most birds breed since here they have protection from mammal predators. Species such as the Hoary-headed Grebe (*Podiceps novae-hollandiae*), Black Swan (*Cygnus atratus*), Black-fronted Dotterel (*Charadrius melanops*), Red-capped Dotterel (*C. alexandrinus*), Red-kneed Dotterel (*C. cinctus*), White-headed Stilt (*Himantopus himantopus*), Red-necked Avocet (*Recurvirostra novae-hollandiae*) and Grey Teal (*Anas gibberifrons*) regularly nest on these islets when conditions are favourable. The four species observed in 1960 are not usually present but they were stimulated to breed by the presence of extensive expanses of water and numerous islets. Under such conditions, food is abundant.

It is possible that some of these species, e.g., Gull-billed Tern and Marsh Tern, were brought into this region by the activity of two tropical cyclones off the north-west coast in March, 1960.

Tree-nesting aquatic birds, such as those recorded in 1961, apparently breed after flooding of the large rivers. Under these conditions large pools along the rivers usually persist for some considerable time and these form focal points for feeding and consequently breeding purposes. These pools are in most cases fringed with tall river gums (*Eucalyptus camaldulensis*) in which nests can be suitably built.

Nesting has been observed to take place both in the late summer and autumn and in the spring. Unfortunately I was not able to get into the field in the intervening months to find out whether winter conditions (including low temperatures) inhibited or retarded breeding, as appears to be the case with land birds (cf. Serventy and Marshall, 1957: 118).

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LIGHT TRAP CATCHES OF TWO SPECIES OF RICE STEM BORER MOTHS NEAR WYNDHAM

By L. E. KOCH, W.A. Museum, Perth.

Information about the abundance of insects in the Kimberley area is unfortunately very meagre. Two of the few insects studied there in any detail have been the rice stem borer moths, *Tryporyza innotata* (Walker) and *Niphadoses palleucus* Common. These belong to the subfamily Schoenobiinae (Lepidoptera: Pyralidae).

These moths occurred among the experimental crops of cultivated rice that were grown at the Kimberley Research Station in the Ord River district, near Wyndham. The caterpillars caused